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(54) **BEVERAGE CONTAINER CAP**

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6,990,860 B1	1/2006	Gillanders
7,011,227 B2	3/2006	Ward et al.
7,020,508 B2	3/2006	Stivoric et al.
D547,607 S	7/2007	Forsman
7,416,093 B2 *	8/2008	Lin et al. 220/254.5
D584,566 S	1/2009	Fuller
D586,184 S	2/2009	Miller et al.
D592,913 S	5/2009	Pinelli et al.
7,783,344 B2	8/2010	Lackey et al.
D652,256 S	1/2012	Eyal
D656,787 S	4/2012	Phillips et al.
D657,618 S	4/2012	Wahl
D675,059 S	1/2013	Carreno
8,360,267 B1	1/2013	Chiou et al.
8,378,830 B2	2/2013	Moran

(Continued)

FOREIGN PATENT DOCUMENTS

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EP	1292218 A1	3/2003
EP	2472488 A1	7/2012

OTHER PUBLICATIONS

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B65D 47/26 (2006.01)

Hydrachcoach, Hydration Monitors, www.hydrachcoach.com, 2004, 2 pages.

(Continued)

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B65D 2543/00055 (2013.01)

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47/26; B65D 2543/00055
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220/203.23, 203.04, 212, 303, 710.5, 713;
215/387, 260, 311, 315, 307; 206/217;
702/154; 340/573.1, 686.1

See application file for complete search history.

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(57) **ABSTRACT**

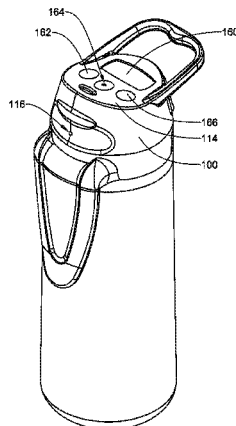
A cap for use with a beverage container comprising a housing that attaches to a beverage container, the housing comprising an opening for dispensing the contents of the beverage container and further comprising a valve activated by a valve button. A sensor within the housing estimates the amount of a fluid that has been dispensed from the opening and a display device is provided for displaying the amount of fluid that has been dispensed from the opening. The display device may be any type of display, including an LED display, and LCD display, or a plurality of indicator lights.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,964,631 A *	6/1976	Albert 220/715
4,099,642 A	7/1978	Nergard	
6,062,419 A	5/2000	Kruger et al.	

14 Claims, 10 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

8,397,940 B2 3/2013 Steininger
 D679,541 S 4/2013 Samartgis
 8,574,165 B2 11/2013 Marsh
 D696,073 S 12/2013 Miller et al.
 8,602,238 B2 12/2013 El-Saden et al.
 8,611,992 B2 12/2013 Goldstein et al.
 D700,012 S 2/2014 Hurley et al.
 8,734,341 B2 5/2014 Howell et al.
 D707,124 S 6/2014 Blain et al.
 D707,492 S 6/2014 George et al.
 2005/0115977 A1 6/2005 Dibdin et al.
 2006/0231109 A1 10/2006 Howell et al.
 2007/0048224 A1 3/2007 Howell et al.
 2008/0089993 A1 4/2008 Hwang et al.
 2009/0080180 A1 3/2009 Bertken
 2009/0250480 A1 10/2009 Pinelli
 2011/0036801 A1 2/2011 Krans et al.
 2011/0050431 A1 3/2011 Hood et al.
 2011/0309095 A1 12/2011 Pinelli

2012/0037651 A1 * 2/2012 Steuer 220/714
 2012/0094261 A1 4/2012 Hayn et al.
 2012/0259180 A1 10/2012 Rock
 2013/0319915 A1 12/2013 Gellibolian et al.
 2014/0182952 A1 7/2014 Yuen et al.
 2014/0221788 A1 8/2014 Teller et al.
 2014/0221792 A1 8/2014 Miller et al.
 2014/0249388 A1 9/2014 Howell et al.
 2014/0311239 A1 10/2014 Marjanovic et al.

OTHER PUBLICATIONS

Hydracoach, Hydracoach Intelligent Water Bottle User Guide, 2007, 14 pages.
 Kickstarter, "Track your water intake and Hydrate better with The Hug", 2014, 16 pages.
 Vessyl Design, Faq page, 2014, 7 pages.
 Contigo, Innovation Web Page, www.gocontigo.com, 2015, 3 pages.
 CafePress Travel Mug, Web Page, <http://www.cafepress.com/+mugs?cat=203071>, 2015, 2 pages.

* cited by examiner

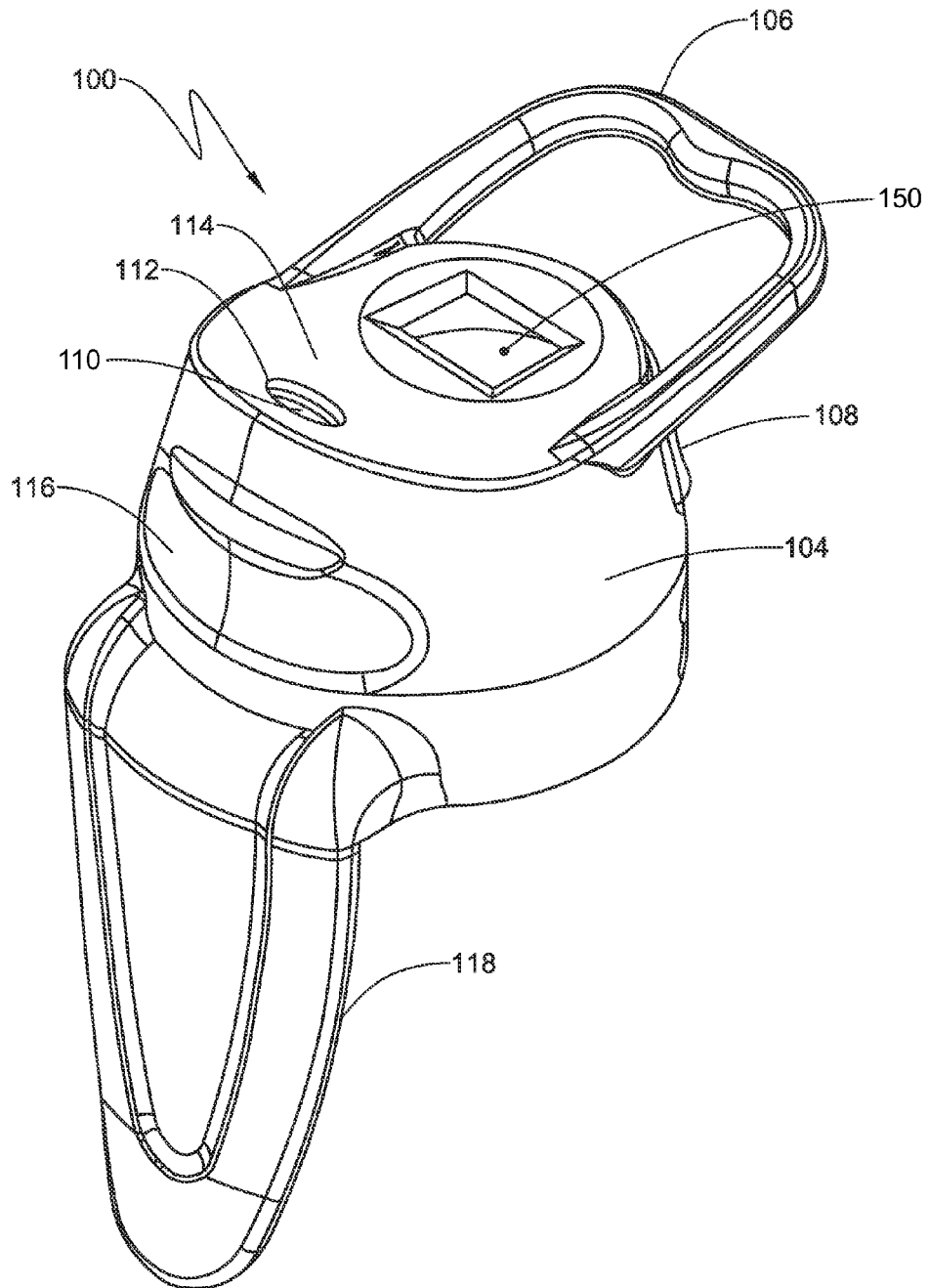


FIG. 1

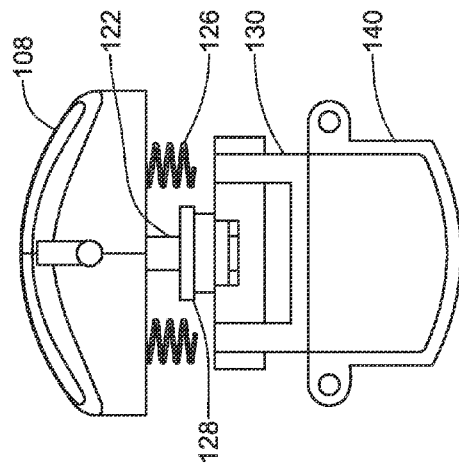


FIG. 2A

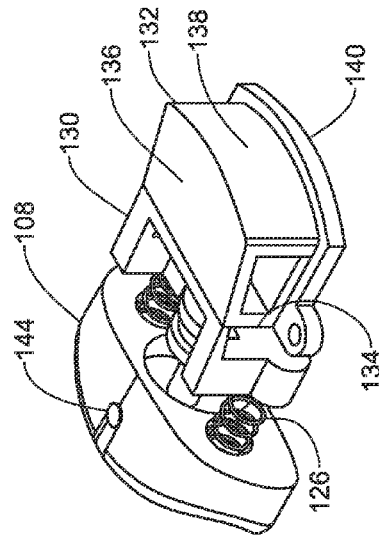


FIG. 2B

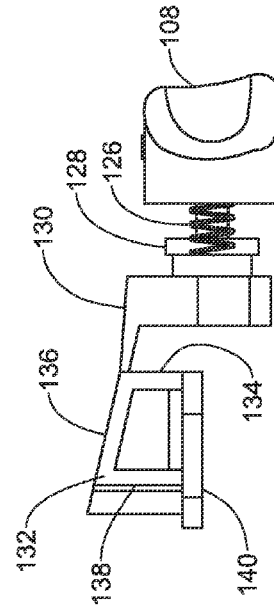


FIG. 2C

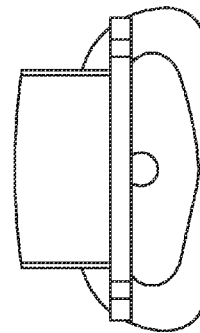


FIG. 2D

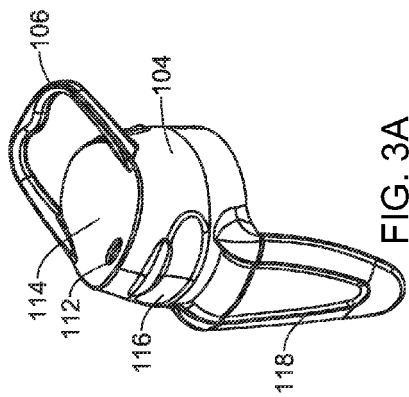


FIG. 3A

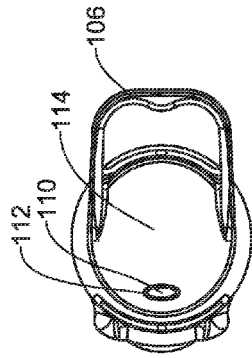


FIG. 3C

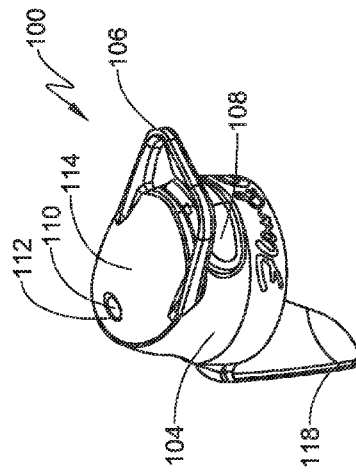


FIG. 3B

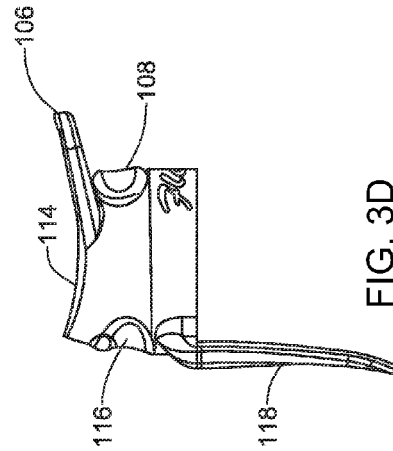


FIG. 3D

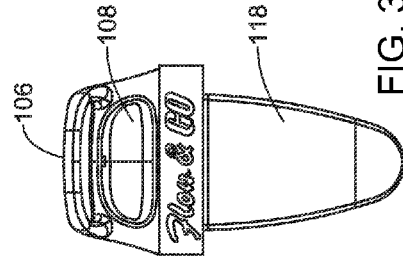


FIG. 3E

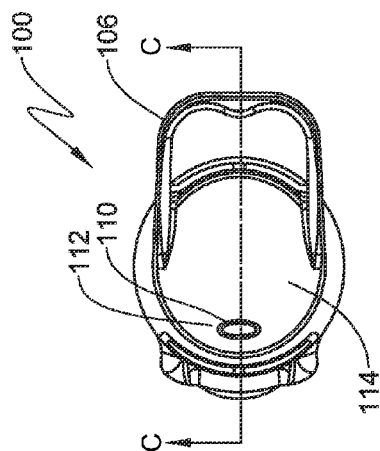


FIG. 4A

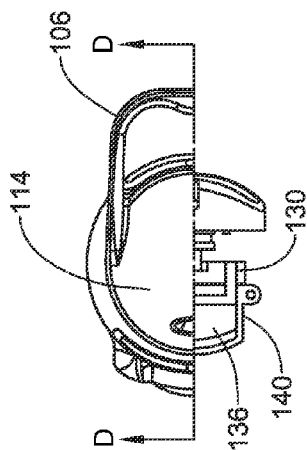


FIG. 4B

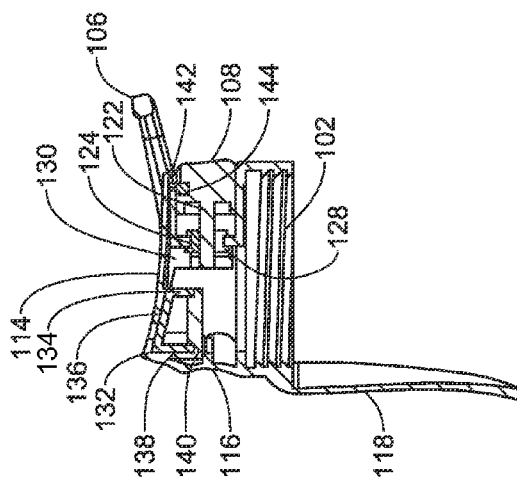


FIG. 4C

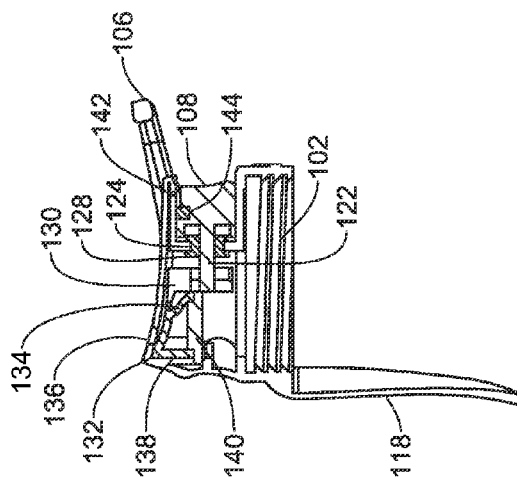


FIG. 4D

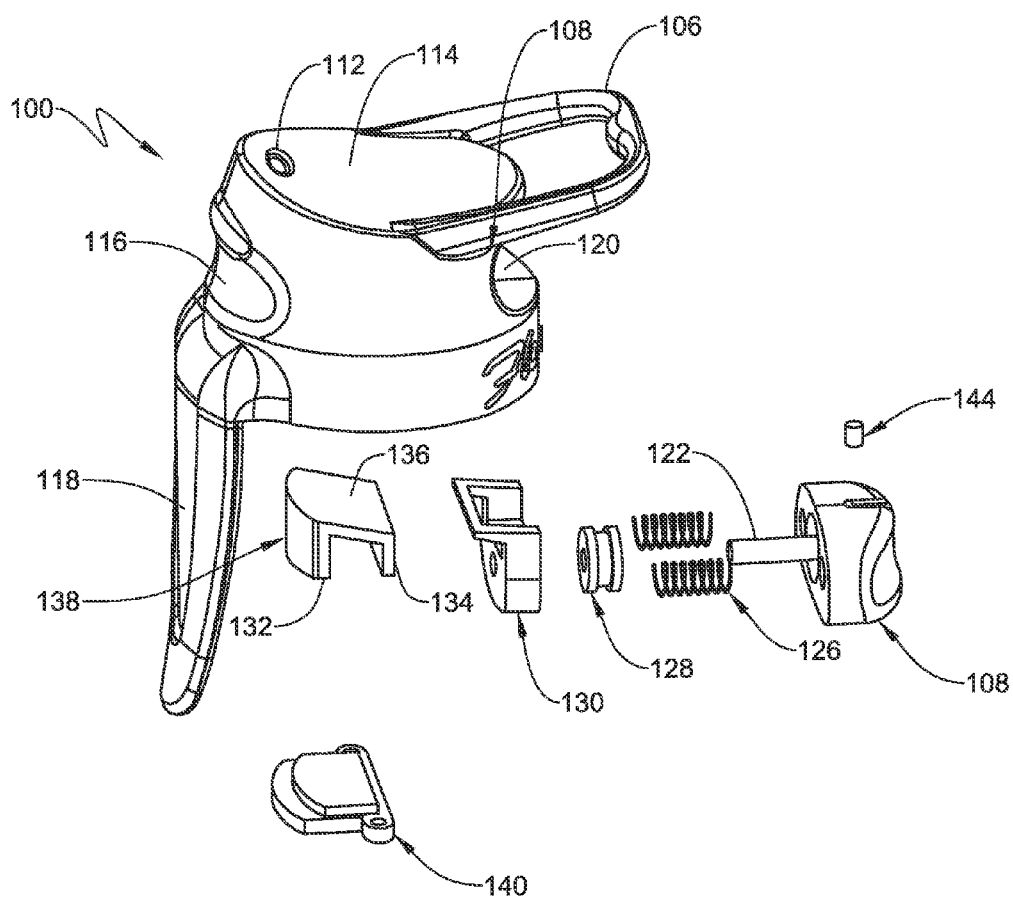


FIG. 5

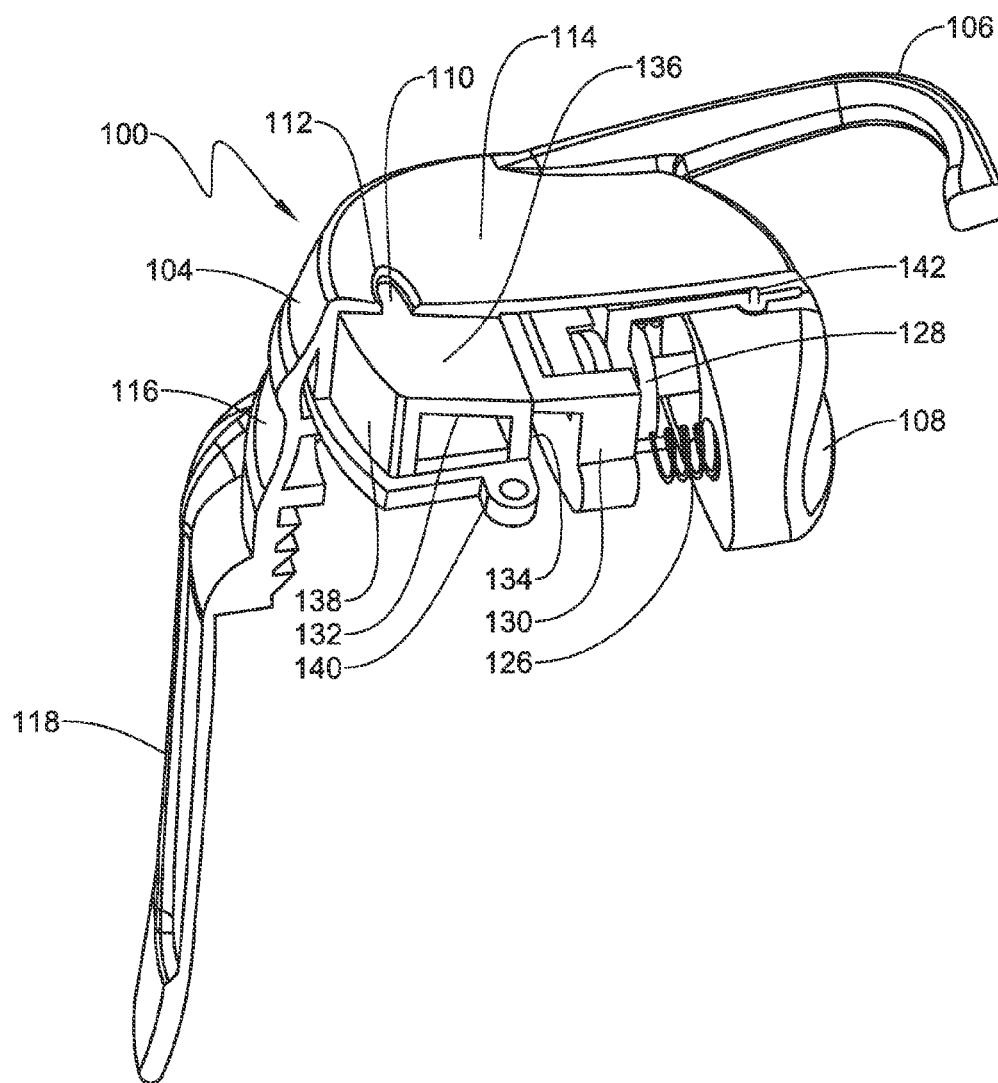


FIG. 6

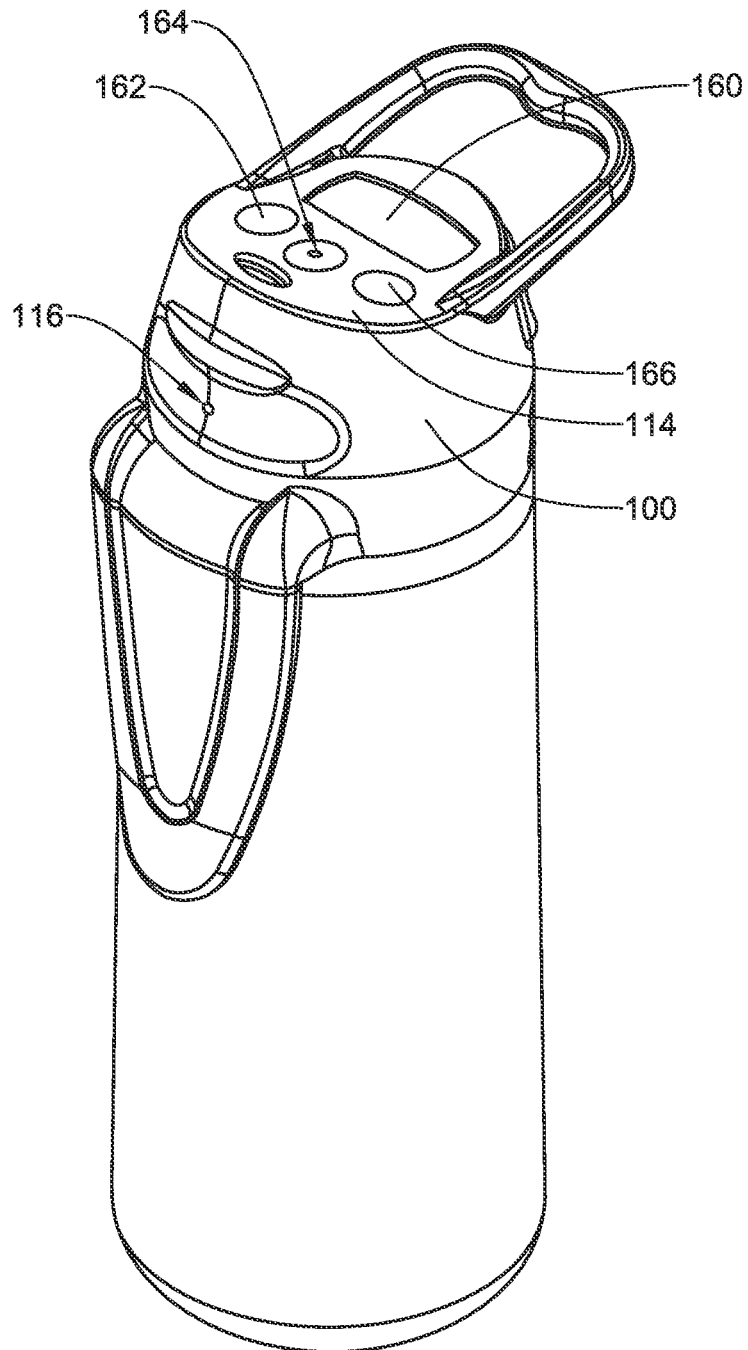


FIG. 7

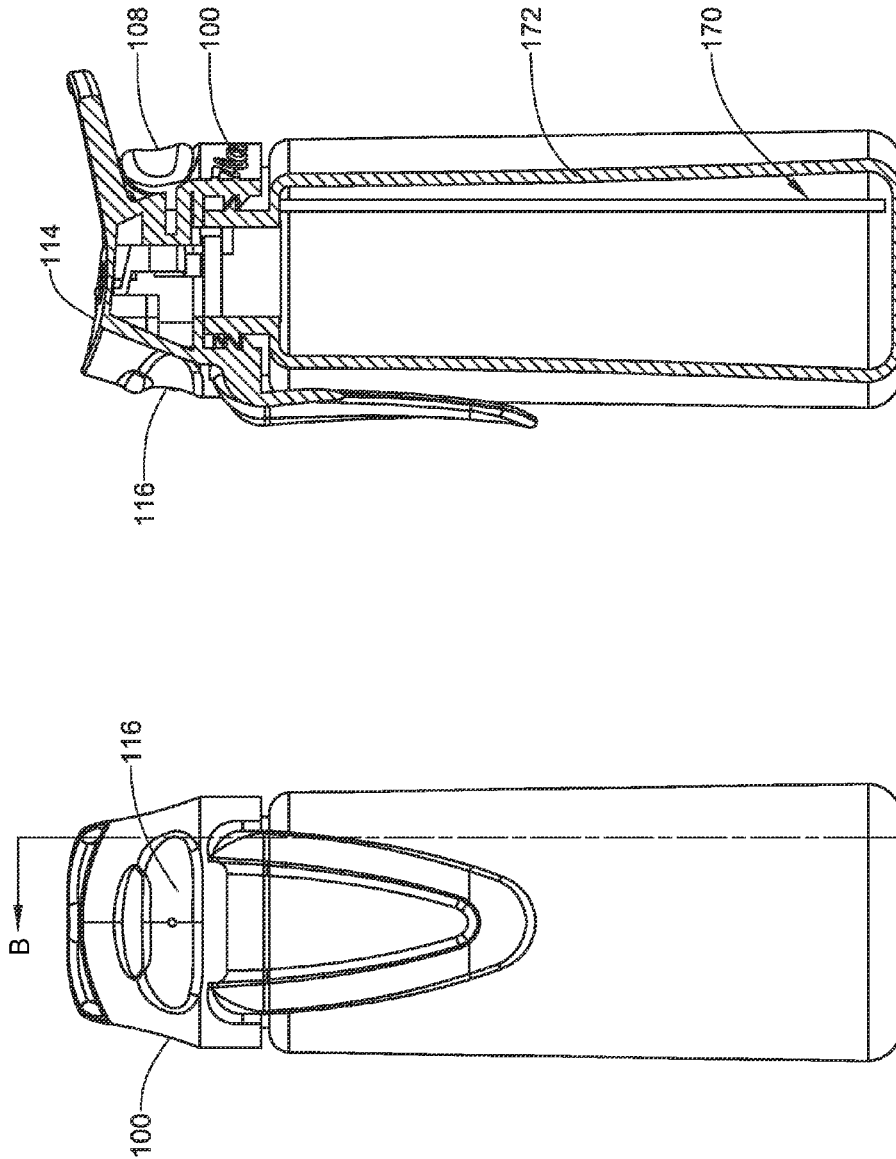


FIG. 8B

FIG. 8A

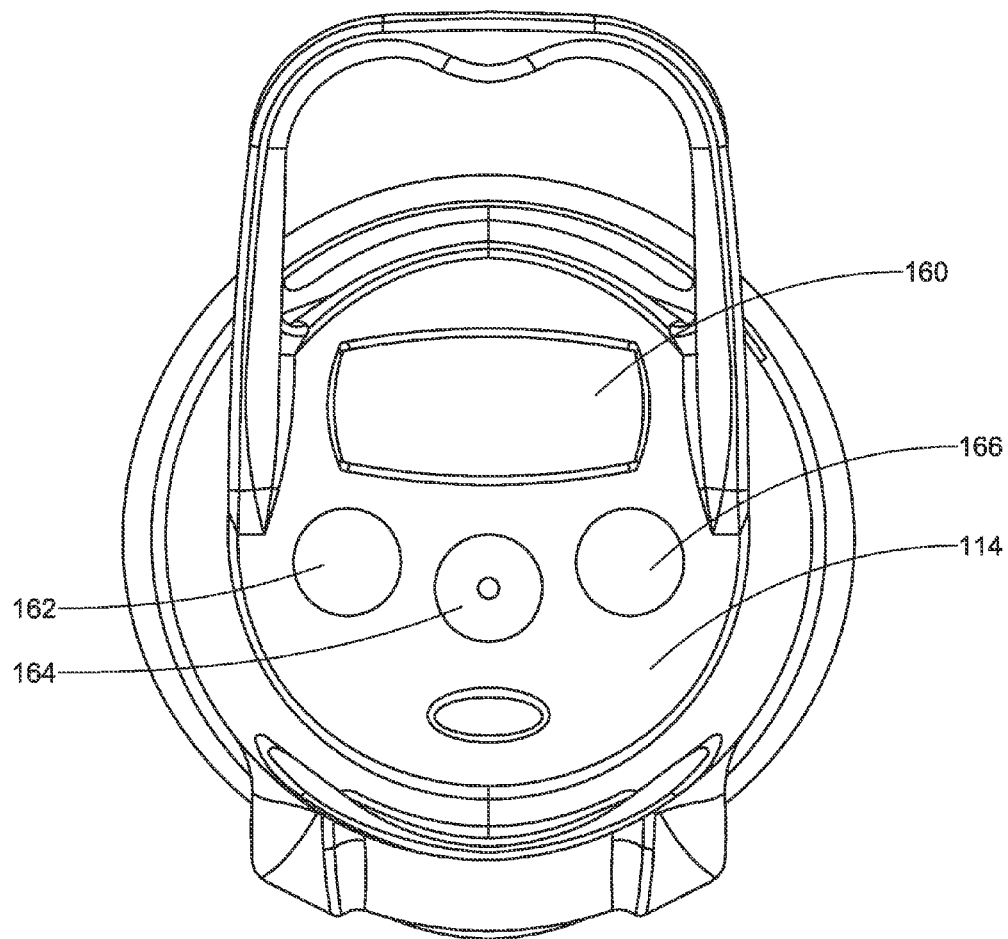


FIG. 9

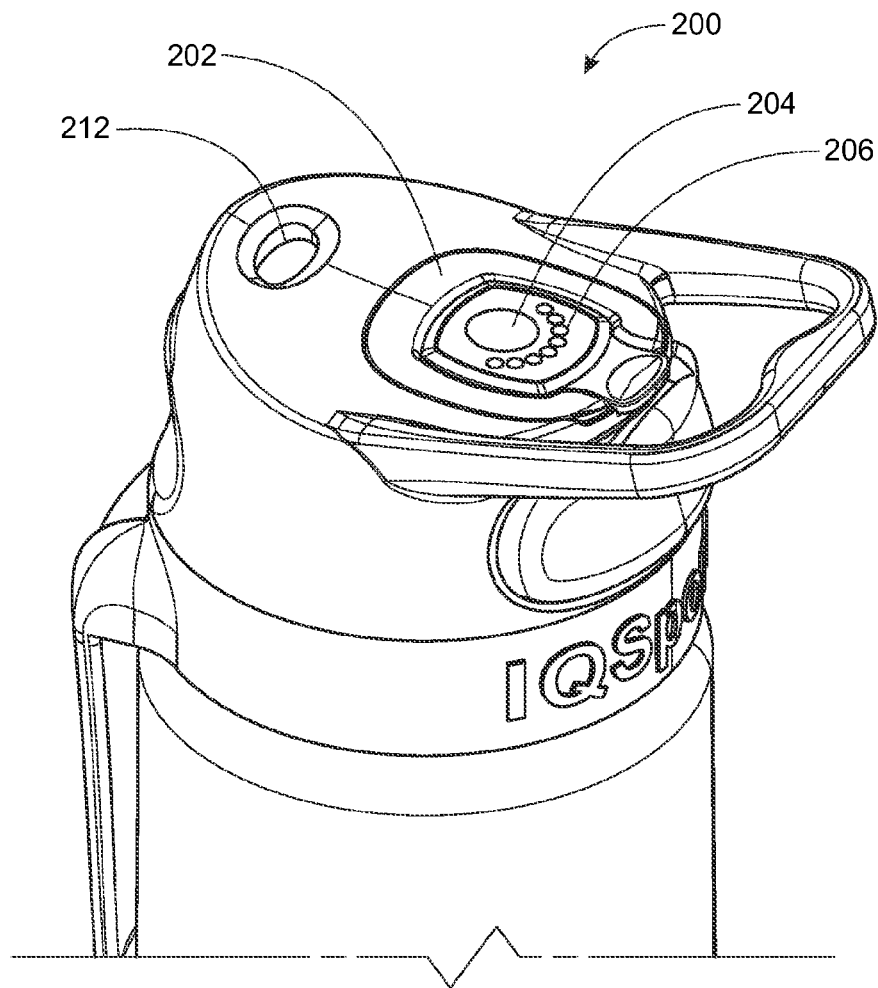


FIG. 10

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BEVERAGE CONTAINER CAP

This is a continuation-in-part of application Ser. No. 13/780,145, filed Feb. 28, 2013, which is hereby incorporated by reference in its entirety as if set forth herein, and which is a continuation-in-part of Application Ser. No. 29/446,761, filed Feb. 27, 2013, which is hereby incorporated by reference in its entirety as if set forth herein.

BACKGROUND OF THE INVENTION**1. Field of the Invention**

The invention relates generally to the field of beverage container caps and containers. In particular, the invention relates to a reusable, washable cap that can be used with a variety of different beverage containers.

2. Description of Related Art

The prior art includes reusable water bottles and other insulated and non-insulated beverage containers with removable caps of various types. Such beverage containers come in a huge variety of styles and configurations with caps ranging from simple threaded lids that must be completely removed to drink the beverage, to complex systems with straws, valves, and other mechanisms. Existing systems, however, have failed to meet the need for a beverage container and cap that is easy to carry, easy to use without unwanted spillage, and dishwasher safe. Existing beverage containers have further failed to meet the need to provide users with useful information during use of the container as part of various activities such as walking, hiking, biking, etc.

The present invention overcomes these problems, providing a dishwasher safe cap for a beverage container that can be carried by hand or securely attached to a belt, garment, or bag, with a simple, reliable valve. The cap can be equipped with various sensors and output devices that provide a range of useful information to the user.

SUMMARY OF THE INVENTION

In various exemplary embodiments, the invention comprises a cap for use with a beverage container comprising a housing that attaches to a beverage container, the housing comprising an opening for dispensing the contents of the beverage container and further comprising a valve activated by a valve button. A sensor located within the housing estimates the amount of a fluid that has been dispensed from the opening and a display device is provided for displaying the amount of fluid that has been dispensed from the opening. The display device may be any type of display, including an LED display, and LCD display, or a plurality of indicator lights. The cap may further include a tilt sensor within the housing that activates a timer only when the beverage container is tilted in an orientation for drinking. In various exemplary embodiments, the sensor located with the housing is a switch that is opened or closed when the valve is activated and a timer controlled by the switch may determine the amount of time the valve is activated. The amount of fluid dispensed from the beverage container may be determined based on the amount of time the valve is activated and the average flow rate out of the opening in the cap.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing an exemplary embodiment of the beverage container cap described herein.

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FIG. 2A is top view of an exemplary embodiment of a valve button, actuator and valve sealing mechanism in accordance with the present invention.

FIG. 2B is perspective view of an exemplary embodiment of a valve button, actuator and valve sealing mechanism in accordance with the present invention.

FIG. 2C is side view of an exemplary embodiment of a valve button, actuator and valve sealing mechanism in accordance with the present invention.

FIG. 2D is front view of an exemplary embodiment of a valve button, actuator and valve sealing mechanism in accordance with the present invention.

FIG. 3A is perspective view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 3B is an alternate perspective view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 3C is a top view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 3D is a side view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 3E is a front view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 4A is a top view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 4B is a partial section top view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 4C is a section C-C side view of an exemplary embodiment of a container cap in accordance with the present invention with the valve closed.

FIG. 4D is a section D-D side view of an exemplary embodiment of a container cap in accordance with the present invention with the valve open.

FIG. 5 is an exploded view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 6 is a perspective partial section view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 7 is a perspective view of an exemplary embodiment of a container cap in accordance with the present invention attached to a bottle.

FIG. 8A is a front view of an exemplary embodiment of a container cap in accordance with the present invention attached to a bottle.

FIG. 8B is a section B-B view of an exemplary embodiment of a container cap in accordance with the present invention attached to a bottle.

FIG. 9 is a top view of an exemplary embodiment of a container cap in accordance with the present invention.

FIG. 10 is perspective view of an exemplary embodiment of a container cap in accordance with the present invention.

DESCRIPTION OF EXEMPLARY EMBODIMENTS OF THE INVENTION

The following description is presented to enable any person skilled in the art to make and use the invention. For purposes of explanation, specific nomenclature is set forth to provide a thorough understanding of the present invention. Descriptions of specific embodiments or applications are provided only as examples. Various modifications to the embodiments will be readily apparent to those skilled in the art, and general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown, but is

to be accorded the widest possible scope consistent with the principles and features disclosed herein.

Referring to the accompanying drawings, in an exemplary embodiment of the invention a cap **100** attaches to a beverage container by means of threads **102** that engage complimentary threads on the beverage container. It will be understood that other systems and structures can be used to attach the cap to the beverage container, such as elastomeric seals, snap fit connections, etc. Any such attachment that provides a secure, fluid-tight seal between the beverage container and cap may be used. Moreover, cap **100** can be used with any type of beverage container having any shape, configuration, or construction and including without limitation steel and plastic water bottles, coffee and other insulated cups, etc.

In various exemplary embodiments, cap **100** comprises a housing **104** that connects to the beverage container and that may be made from a single piece or assembled from two or more component parts. Housing **104** may include a handle **106** extending outward from the housing to allow the user to easily carry the beverage container by hooking it through one or more fingers or by attaching it to a garment or bag by a hook or other connector such as a carabiner. Housing **104** may also include a valve button **108** that can be actuated by pressing it inward relative to the outer surface of the housing **104** to open a valve **110** and allow the beverage in the container to flow out of the opening **112**. In various exemplary embodiments, handle **106** extends from the housing **104** at a location above and adjacent to the valve button **108** to provide a stable structure for the user's hand to securely grasp the beverage container and cap **100** when the valve button **108** is actuated.

The beverage in the container attached to the cap **100** flows from opening **112** when valve **110** is opened. In an exemplary embodiment of the invention, opening **112** is located near the periphery of a top surface **114** of the housing **104**. In various embodiments, top surface **114** may take any shape and may be contoured to manage the flow of liquids that escape from the opening **112**. In an exemplary embodiment as shown in the accompanying drawings, top surface **114** can be sloped back and away from opening **112** and slightly down to the sides to prevent accumulation of fluids and to direct the flow of any fluids that leak from the opening **112** away from the user. By positioning the opening as shown on the top surface **114**, the taper and angle provide for a proper mouth fit for easy drinking, with no place for fluids to collect.

In an exemplary embodiment of the invention, valve button **108** is located on a side surface of the housing **104**. Valve button **108** is actuated by the user by depressing it inwardly relative to the side surface of housing **104**. As shown in the accompanying drawings, in an exemplary embodiment of the invention valve button **108** is located on the side surface of housing **104** generally opposite the peripheral location of opening **112**. In this location, one or more of the user's fingers will naturally land on the valve button **108** when the beverage container is grasped and raised the user's mouth. Handle **106** can also be arranged such that the user's finger will naturally be positioned on the valve button **108** when the user grasps the beverage container. In various exemplary embodiments, handle **106** extends out and up from the edge of the top surface **114** of the housing **104** at a location above and adjacent to the valve button **108** at an angle of 15-25 degrees from horizontal. This location and upward angle allows for a comfortable, secure grip that naturally places the user's index finger directly on the valve button **108** so that the valve can be operated while maintaining a secure grip on the beverage container.

Valve button **108** may be contoured to naturally engage the user's finger so that it can be easily depressed by pressure

from the user's finger. Housing **104** may also include a gripping area **116** on the side surface of housing **104** adjacent to opening **112** where the user's thumb will naturally land when the beverage container is grasped for use. Gripping area **116** may be contoured or provided with a surface that improves frictional engagement by the user's thumb.

In an exemplary embodiment of the invention, housing **104** includes a clip **118** that extends downward from lower periphery of housing **104** and can be slipped over a belt or other strap, or into a pocket on a garment or bag to securely hold the beverage container. Clip **118** may be contoured to improve engagement with such structures. In an exemplary embodiment, the inner surface of clip **118** is concave to provide for secure engagement when used with a belt or in a pocket. Some or all of clip **118** may also be contoured or may be comprised of a material that improves frictional engagement such as an elastomeric material or coating.

In an exemplary embodiment of the invention, valve button **108** can be depressed into a valve button cavity **120** extending into the housing **104**. Valve button **108** may include a valve button shaft **122** or other extension that extends through an aperture **124** in the valve button cavity **120** into the interior of housing **104**. Valve button **108** may be biased outward by springs **126** or any other suitable biasing mechanism. In an exemplary embodiment, a button shaft seal **128** seals the aperture **124** and may retain the valve button shaft **122** to retain the valve button **108** in the valve button cavity **120**. In various embodiments, other mechanisms such as elastomeric seals or molded stops can be used to retain the valve button **108** in the valve button cavity **120**.

In an exemplary embodiment of the invention, valve button shaft **122** is attached to valve seal actuator **130**. The valve seal actuator **130** is located inside housing **104**, and in its resting position may be adjacent to the valve button cavity **120**. The valve seal actuator **130** may help retain the valve button **108** in the valve button cavity **120**.

In various exemplary embodiments of the invention, valve seal **132** comprises an elastomeric material that is preferably a food-grade material such as silicone. Other elastomeric materials such as thermoplastic elastomers or similar materials that can maintain their shape over time may also be appropriate. Valve seal **132** may take any suitable shape and be placed in a suitable location that allows it to be retained within housing **104** in a resting position where it seals off fluid flow from opening **112**. In various exemplary embodiments, valve seal **132** is slightly loaded such that it is biased against the internal top surface of the housing **104** in the region of the opening **112** to seal the opening **112**. By mounting the valve seal **132** under a slight load, the valve seal **132** uses the spring force of the elastomer itself to achieve and maintain a seal, thus eliminating the need for a separate biasing mechanism.

In an exemplary embodiment of the invention, valve seal **132** has a generally U-shaped profile with a generally vertical actuating side **134**, a sealing side **136** that matches the interior contours of the housing **104** in the area of opening **112**, and a generally vertical anchor side **138** that may be contoured to match the shape of the interior side of the housing **104** or other adjacent surface. The actuating side **134** is disposed toward the interior of the housing **104** and the anchor side **138** is adjacent to the housing **104** or another surface or feature that maintains the anchor side in a fixed position. At rest, the sealing side **136** is in contact with inner side of the top surface **114** of the housing **104** and may be under a slight load such that it completely covers and seals the opening **112**. In an exemplary embodiment, a seal mounting plate **140** is affixed to housing **104** and the valve seal **132** is seated in the seal mounting plate **140**, holding the valve seal **132** in position

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within the housing 104. In an exemplary embodiment of the invention, an appropriate load on the valve seal 132 can be achieved by positioning seal mounting plate 140 relative to the interior of top surface 114 of housing 104 so that the valve seal 132 is compressed in the range of 20 to 30 thousandths of an inch.

In various exemplary embodiments of the invention, the valve seal 132 seals the opening 112 in the resting position but can be deformed by a force exerted by valve actuator 130 such that it no longer seals the opening 112. Referring to valve sections C-C (closed) and D-D (open) shown in FIGS. 4C and 4D, in an exemplary embodiment of the invention, when the valve button 108 is depressed into the valve button cavity 120, valve actuator 130 is forced in a lateral direction such that a portion of the valve actuator 130 exerts a force on the actuating side 134 of the valve seal 132. This force on the actuating side 134 of the valve seal 132 causes the valve seal 132 to elastically deform away from the opening 112. As long as a fluid path is maintained from the beverage container through the housing 104 to the opening 112, the beverage can be dispensed through opening 112.

The valve actuator 130 can be configured using a wide range of geometries to allow for a fluid path through the housing 104 to the opening 112. In one exemplary embodiment, valve actuator 130 has a main body that extends in a generally vertical direction and that is attached to the valve button shaft 122 such that it moves in a lateral direction when the valve button 108 is pressed by the user. The valve actuator has a generally U-shaped section that extends laterally to a point adjacent to or in contact with the valve seal 132 on the upper portion of the actuating side 134 in the resting position with the valve closed. A large aperture extends through the valve actuator 130 below and in the area of the generally U-shaped lateral extension, which allows fluid to easily pass through the valve actuator. When the valve button 108 is pressed by the user, the valve actuator 130 moves laterally such that the generally U-shaped lateral extension exerts a lateral force on the upper portion of the actuating side 134 of the valve seal 132, deforming the valve seal 132 to overcome the sealing bias, and separating the sealing side 136 from the inner surface of the top of the housing 104 and opening 112. The opening 112 is then open to fluid flowing from the beverage container through the aperture in the valve actuator 130.

It will be readily understood by those skilled in the art that the arrangement and geometries of the various valve components described herein can be varied to achieve the same result of a deformable, elastomeric valve seal. For example, the geometry and mounting of the valve seal 132 can be changed in a variety of ways that still use the spring force of the elastomer itself to achieve and maintain a seal. Similarly, the geometry and mounting of the valve actuator 130 can be changed in a variety of ways that achieve the necessary deformation of the valve seal 132 while allowing a fluid path from the beverage container to the opening 112 when the valve is open.

In various exemplary embodiments of the invention, the valve button cavity 120 is sealed such that the valve button 108 and the biasing springs 126 or other button biasing mechanism do not come in contact with the contents of the beverage container and are kept clean and dry. Because the exposed parts disposed within the interior of the housing 104 are firmly attached and made of a suitable elastomer or other durable material, this allows the entire cap 100 to be completely immersed in water for cleaning by hand or in a dishwashing machine. The simplicity of the design allows for the cap to be made so that it is microwave safe.

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In various exemplary embodiments, an air vent can be provided in the housing 104 to provide for free fluid flow through the opening 112. In an exemplary embodiment, an air vent 142 is located in button cavity 120 and can be provided with an air vent seal 144 to prevent the unintentional release of fluids from the air vent 142. This location improves the aesthetics of the beverage cap by placing the air vent 142 in a location where it cannot be seen. In an exemplary embodiment, air vent seal 144 is affixed to valve button 108 and positioned such that it seals the air vent 142 in the resting position when the valve is closed, but then moves laterally so that the air vent 142 is open when the valve button 108 is pressed by the user and the valve is opened. In this arrangement, the air vent seal 144 and the valve seal 132 are both actuated by pressure on the valve button 108, such that both are actuated simultaneously so that the fluid can flow freely to the opening 112.

In various exemplary embodiments, the housing 104 can provide a cavity 150 for mounting decorative items, instruments such as a compass or altimeter, or informational devices such as display screens. In various exemplary embodiments, the beverage container cap can be equipped with one or more digital processors, storage devices, output devices, sensors, accelerometers, gyroscopes, GPS systems, pedometers, physiological monitors, thermometers, etc. that provide information that can be output to the user via a display mounted in cavity 150. Sensors can be placed at appropriate locations throughout the housing including the valve button 108 and gripping area 116 where the user's hands naturally grip the cap during use. Systems can be provided to measure, store, and display instantly or over time the user's heartrate, respiration rate, blood pressure, blood oxygen level, hydration or any other physiological characteristics. Systems can also be provided to measure, calculate, store, and display instantly or over time trip, location, and activity information such as physical location, temperature, humidity, barometric pressure, time, elapsed time, number of steps, alarms, altitude, etc.

In various exemplary embodiments the cap 100 can be fitted with a display device 160 such as an LCD screen to display information to the user. Where an appropriate cavity 150 is provided, the screen may be positioned on the top surface 114 of the cap 100 so that it can be easily seen by the user. Various controls can be positioned at appropriate locations on the cap 100 to select the information to be displayed on display device 160. In various exemplary embodiments control buttons 162, 164, 166, can be provided, or the display screen 160 may be a touchscreen with controls that are activated by the user's touch or gesture.

In various exemplary embodiments, digital storage, processing, and communications can be provided to manage data collected by such systems. Communications such as Bluetooth, WiFi, WAN, NFC, cellular, etc. to allow the system to communicate with smartphones, laptops, networks, cloud-based systems, etc. to transfer, exchange, or receive information for storage or display to the user. Such systems would allow the user to transfer information gathered during their activities for storage and use without the need to carry any additional electronic devices. For example, a cap could be equipped with sensors that gather basic physical information such as heartrate, respiration rate, blood pressure, blood oxygen level and hydration levels. This information can be stored and/or displayed to the user via a display device 160 located in cavity 150, and transferred to a remote system for storage, compilation, analysis and display on a different device such as a smartphone, tablet, or other computer. The system can be

controlled by any appropriate user interface mounted in the housing such as a touchscreen, buttons, or other user input devices.

As indicated above, wide range of different sensors may be used to gather information relevant to the user. In various exemplary embodiments, a probe **170** or sensor may extend into the container **172** that measures the quantity of fluid in the container **172**. Such a device could measure the fluid level using a capacitance probe, a resistance probe, an ultrasonic sensor, an optical sensor, a mechanical float, a pressure sensor, or any other technique. A processor can then use the fluid level measurement to determine the quantity of fluid that has been consumed over time. The system can then display the quantity of fluid consumed by the user on display device **160**. The probe can extend from the cap into the container **172**, or can be built-in or attached directly to the container **172** itself and feed data to the cap or device for display to the user.

The user's heart rate can be measured and displayed to the user on display device **160**. Heart rate can be detected by measuring electrical signals between two locations on the user's body, such as between the two hands or between one hand and another part of the body, between two fingers, or even between two points on one finger. Heart rate can also be detected using optical sensors that measure the relative amount of light transmitted through a finger or thumb, or by any other technique that may be developed. Heart rate sensor electrodes can be provided on the valve button **108** and gripping area **116** where the user's hands naturally grip the cap during use, or on one or more of the control buttons **162**, **164**, **166**, or at any other locations on the cap **100** or container **172**.

The user's step count can similarly be measured and displayed to the user on the display device **160**. Step count can be measured using an electronic accelerometer of any type, mechanically such as using a weighted spring that contacts a switch, flexes a piezo membrane, or flexes a strain gauge, a vibration sensor, or by any other suitable means in the cap **100** or container **172**.

In various exemplary embodiments a range of different information can be sensed and displayed to the user. For example, control buttons **162**, **164**, **166** could be used to display heart rate, fluid consumption, and step count respectively, or similar controls could be accessed via a touchscreen display. Display controls can be programmed to display any available information to the user via display device **160**.

In various exemplary embodiments, the valve mechanism is designed to preserve open volume below the top surface **114** of housing **104** in the area opposite opening **112** such that cavity **150** can be positioned in the best possible location to be viewed by the user without the need to increase the size or volume of the housing **104**. In an exemplary embodiment of the invention, the valve actuator has a generally U-shaped section that extends laterally to a point adjacent to or in contact with the valve seal **132** on the upper portion of the actuating side **134** in the resting position with the valve closed as described above to maintain space for cavity **150** in the best location within housing **104**.

In various exemplary embodiments the cap may include a measurement device and display that can inform the user how much fluid has been dispensed from the beverage container over a specified period of time such as a day. The cap may be equipped with any type of flow meter, measurement, or estimation system to determine or estimate how much fluid has been dispensed, and a display such as is described above to inform the user of this information.

Referring to FIG. **10**, in various exemplary embodiments, a cap **200** can be equipped with a display housing **202** containing a control button **204** and a plurality of small indicator

lights **206**. The control button can be used to reset the display or program it to output different information. The indicator lights can be used to indicate the amount of fluid that has been dispensed since the last reset, or over a particular period of time such as a day or a week, by sequentially lighting up as additional fluid is dispensed. Such a system can be designed to automatically reset at a certain time interval, such as every day. This allows the user to quickly determine how much fluid they have consumed. In various exemplary embodiments, the indicator lights may be replaced with an LED display, an LCD display, bar graphs, numerical outputs, etc.

In various exemplary embodiments, the electronics housing can be detachable so that the cap can be cleaned in the dishwasher. As discussed above, in various exemplary embodiments, digital storage, processing, and communications can be provided to manage data collected by such systems. Communications such as Bluetooth, WiFi, WAN, NFC, cellular, etc. to allow the system to communicate with smartphones, laptops, networks, cloud-based systems, etc. to transfer, exchange, or receive information for storage or display to the user. Such systems would allow the user to transfer information gathered during their activities for storage and use without the need to carry any additional electronic devices.

In various exemplary embodiments, the amount of fluid that has been dispensed from the beverage container can be determined or estimated using a variety of different techniques and devices. In one exemplary embodiment, an electronic switch can be placed in parallel with the water valve located in the cap so that when the valve is activated, the switch is opened or closed. The switch can be connected to a timer that tracks the amount of time the water valve is kept open, which in turn can be used to calculate the amount of fluid dispensed based on the average flow rate through the opening **212**.

A more accurate estimate may be obtained by including a sensor that can determine when the beverage container is tilted. The sensor could be oriented so that it activates when the beverage container is tilted into the drinking orientation such that the timer would only be activated when the beverage container was in position to dispense the fluid. Further accuracy may be obtained by the use of a small probe to sense the presence of fluid near the opening **212**, such that the time would only be activated when fluid is present near the opening. An additional water sensor could be placed near the top of the beverage container to differentiate between sipping (lower water level) and pouring out at maximum flow (higher water level). Two separate timers and a conversion could be used to further increase the accuracy of the estimated consumption.

In various exemplary embodiments, a direct flow measurement device could be installed inline to precisely measure the actual flow of fluid out of the beverage container.

What is claimed is:

1. A cap for use with a beverage container comprising:
 - a housing that attaches to the beverage container, the housing comprising an opening that dispenses contents of the beverage container and further comprising a valve activated by a valve button;
 - a sensor located within the housing to estimate the amount of a fluid that has been dispensed from the opening;
 - a display device that displays the amount of fluid that has been dispensed from the opening; and
 - wherein said sensor further comprises a tilt switch within the housing.
2. The cap of claim 1, wherein the display device is an LED display.

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3. The cap of claim 1, wherein the display device is an LCD display.

4. The cap of claim 1, wherein the display device is a plurality of indicator lights.

5. The cap of claim 1, wherein the tilt sensor activates a timer only when the beverage container is tilted in an orientation for drinking.

6. The cap of claim 1, wherein the sensor located within the housing is a switch that is opened or closed when the valve is activated.

7. The cap of claim 6, further comprising a timer controlled by the switch to determine an amount of time the valve is activated.

8. The cap of claim 7, wherein the amount of fluid that has been dispensed from the beverage container is determined based on the amount of time the valve is activated and an average flow rate out of the opening of the cap.

9. A cap for use with a beverage container comprising:
a housing that attaches to the beverage container, the housing comprising an opening that dispenses contents of the beverage container and further comprising a valve activated by a valve button;

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a sensor located within the housing to estimate the amount of a fluid that has been dispensed from the opening, wherein the sensor located within the housing is a switch that is opened or closed when the valve is activated; and,

a display device that displays the amount of fluid that has been dispensed from the opening.

10. The cap of claim 9, further comprising a timer controlled by the switch to determine an amount of time the valve is activated.

11. The cap of claim 10, wherein the amount of fluid that has been dispensed from the beverage container is determined based on the amount of time the valve is activated and an average flow rate out of the opening of the cap.

12. The cap of claim 9, wherein the display device is an LED display.

13. The cap of claim 9, wherein the display device is an LCD display.

14. The cap of claim 9, wherein the display device is a plurality of indicator lights.

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